OFFEEVILLE PLANT MATERIALS CENTER

Coffeeville, Mississippi

Report of Activities – 1988

United States
Department of
Agriculture

Soil Conservation Service

COFFEEVILLE PLANT MATERIALS CENTER

COFFEEVILLE, MISSISSIPPI

Report of Activities -- 1988

Including Field Activities in Arkansas, Louisiana, and Mississippi

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COFFEEVILLE PLANT MATERIALS CENTER

COFFEEVILLE, MISSISSIPPI

REPORT OF ACTIVITIES

1989

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INTRODUCTION

The Coffeeville Plant Materials Center (PMC) is part of a network of 25 centers operated by the Soil Conservation Service (SCS). The National Plant Materials program began soon after the SCS was founded because the need to have better plants was recognized at that time. The purpose of the plant materials program is to select improved plant cultivars and develop better methods for the prevention of soil erosion using plants. Currently, the 25 PMCs are evaluating about 22,500 plants for conservation use. In 1988, they cooperatively released 13 new varieties. Of the 285 varieties of superior plants that have been released, 200 were commercially produced in 1988. Many of these are well adapted to the South. The most outstanding of these is probably 'Pensacola' bahiagrass.

The Coffeeville PMC began as part of the much larger Flood Prevention Seed Unit on August 8, 1960. In 1982, the Seed Unit was discontinued, and plant materials activities were reorganized and expanded. Throughout its history, the Coffeeville PMC has evaluated over 6,000 plants. A number of these were determined to be superior conservation plants and were later released not only by Coffeeville but by other PMCs and experiment stations. To date, the Coffeeville PMC has been a participant in the release of seven cultivars as follows:

'Quail Haven' reseeding soybean for wildlife.

'Ellagood' autumn olive for wildlife.

'Gobbler' sawtooth oak for wildlife.

'Meechee' arrowleaf clover for forage.

'Chiwapa' Japanese millet for wildlife.

'Halifax' maidencane for stream channels and shorelines.

'Wilmington' bahiagrass for improved pasture.

SOILS

Most work at the PMC is conducted in nearly level bottom land on Oaklimeter silt loam. These soils are naturally very acid and wet, but they can be very productive with proper water management and drainage. Loring and Grenada silt loams with fragipans dominate the slopes.

WEATHER

Weather during the winter and spring at the Coffeeville PMC typically alternates from cold to warm with frontal passages, and 1988 was no exception. Early in 1988, the weather turned ugly with the passage of a cold front. On January 3, the temperature began to drop, and some sleet fell but did not accumulate. Three days later, 4 inches of snow accumulated and persisted for several days. Temperatures were below freezing, except for brief periods at mid-day from January 4 to 15. February was marked by more intense, but briefer, cold periods that damaged cool-season plantings. On February 12, the temperature fell to 6° F, the lowest for the year. March 19 marked the last freezing temperature in the spring, and planting began as the ground dried.

On April 19, rainfall ceased, and no substantial amount fell until July 11. Only 1.3 inches of precipitation were recorded in May and none in June. The PMC, as well as much of the nation, was suffering from the most severe drought in years. At the PMC, irrigation equipment was brought into service on June 22, saving the spring plantings. After mid-July, irrigation ceased as adequate rainfall fell for the remainder of the year.

Although light frosts had come earlier in the fall, the first killing frost came on November 28, and growth of the warm-season plants ceased after a growing season of 253 days.

TABLE 1. TEMPERATURE AND PRECIPITATION AT COFFEEVILLE PLANT MATERIALS CENTER

Weather Summary for 1988

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Temperature (°F)														
Extreme 1988	High	63	67	77	83	92	103	100	101	94	86	78	60	103
	Low	13	6	22	42	47	56	65	62	52	41	28	18	6
Average 1988	High	42	50	61	69	82	94	90	90	84	69	64	52	71
	Low	29	30	38	49	60	67	73	73	66	50	48	36	52
Average 1975-1987	High	45	52	62	71	78	87	91	89	84	71	60	50	70.0
	Low	28	35	43	51	61	69	73	72	64	51	42	34	51.9
Precipitation (in.)														
Total 1988		2.59	2.51	5.85	4.94	1.30	0.00	4.47	4.87	5.97	4.85	5.76	3.97	47.08
Average 1975 - 1987		4.15	4.41	6.44	5.09	6.40	4.98	3.86	3.06	4.40	4.14	6.95	5.38	59.26

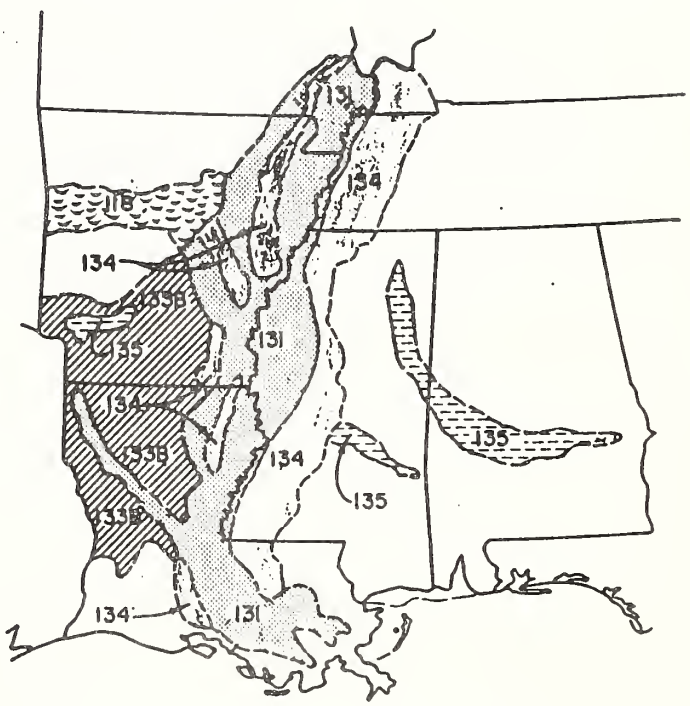
SERVICE AREA

Five major land resource areas (MLRA) are in the Coffeeville PMC Service Area. They are:

MLRA 118: ARKANSAS VALLEY AND RIDGES *
MLRA 131: SOUTHERN MISSISSIPPI VALLEY ALLUVIUM
MLRA 133B: WESTERN COASTAL PLAIN
MLRA 134: SOUTHERN MISSISSIPPI VALLEY SILTY UPLANDS
MLRA 135: ALABAMA, MISSISSIPPI, AND ARKANSAS BLACKLAND PRAIRIE

The PMC service area covers a major portion of Arkansas, Louisiana, and Mississippi. Significant areas of Alabama and Tennessee are included. Climate is humid and temperate. Rainfall is approximately 50 inches for most of the area. Droughts in late summer and autumn are common. Temperature increases from north to south. Summer temperatures of 90° to over 100°F are commonly accompanied by high humidity. Winters are mild in the southern part. Snowfall accumulations are common only in the north. Soil, vegetation, topography, and land usage are closely related to the major resource areas.

SERVICE AREA FOR COFFEEVILLE PMC



* With the dedication of the new PMC at Booneville, Arkansas, on May 9, 1988, MLRA 118 was moved from the Coffeeville PMC Service Area to the Booneville PMC.

LONG RANGE PROGRAM

Conservation problems for the PMC service area are identified in the PMC Long Range Program. Once the priorities are established by the State Conservationists' Advisory Committee, the PMC develops project plans to solve the problems given the highest priority.

Problems related to cropland erosion have been given the highest priority, and most PMC work in 1988 was directed toward solving them. Much of the PMC service area has fertile, but highly erodible soils. Even when the best conservation measures are used, many soils cannot be tilled without excessive erosion.

Needs identified under CROPLAND EROSION CONTROL are:

1. Winter cover compatible with no-till or conservation tillage.
2. Better plants for field borders, waterways, and terraces.
3. Continuous cover for cropland.
4. Vegetative substitutes (flumes) for expensive drop structures.

Only limited work was done on the medium and low priority problems which were the control of erosion on pasture and rangeland, woodland, and critical areas. Needs identified in the long range program under these problems are:

PASTURE AND RANGELAND EROSION CONTROL

1. Perennial cool season forage grasses.
2. Warm season forage grasses.
3. Legumes compatible with grasses.

WOODLAND EROSION CONTROL

1. Desirable plants for clear-cut sites.

CRITICAL AREA EROSION CONTROL

1. Vegetation for excavations and construction sites.
2. Vegetation for streambanks and shorelines.
3. Plants for chemically damages soils.

MAJOR ACTIVITIES IN 1988

Problems in the PMC Long Range Program are too complex to solve in one simple operation so they are broken into a set of simpler components. Then the plant materials center manager, in consultation with appropriate technical specialists, develops project plans designed to solve one segment of the problem. The projects are designed 1) to develop improved methods to use plant materials, and 2) to select and release improved cultivars for conservation purposes.

PROJECTS TO DEVELOP IMPROVED METHODS

The investigation of new methods to use conservation plants has been a part of the Coffeeville PMC operation throughout much of its history. In response to the Farm Security Act of 1985, the PMC placed increased emphasis on developing better methods to solve erosion problems using plants. Much of this work involved developing no-till systems for pasture renovation and the establishment of common row crops. Also, the use of vegetative flumes to replace expensive drop structures was explored. With more emphasis being placed on the no-till cotton phase, all other aspects of these studies were inactivated with the release of four technical reports in 1988 covering these studies.

Cover Crops for Cotton

In 1987, states within the Coffeeville PMC service area vigorously initiated a program to develop and demonstrate methods and plants to use for erosion control in cotton fields. Conservation field trials were started in the fall in cotton fields in Mississippi and Louisiana using the best species currently recognized for cover crops. Plans were developed to extend the trials into Tennessee and Arkansas and to intensify efforts at the PMC. An agronomist, Dr. Herby Bloodworth, began working at the PMC in January 1988 to coordinate and publicize the COTTON PROJECT.

Earlier the Coffeeville PMC had already undertaken no-till studies for cotton. In the spring of 1987, cotton was planted on the center in vetch, wheat, and clovers (crimson, subterranean, ball, and arrowleaf) and compared with conventional methods. Another study, started in the fall of 1987, determined that herbicides and defoliants used in a nearby cotton field were not detrimental to about 30 potential cover crop species. While the studies did not solve all problems associated with growing cotton, they indicated that no-till cotton could be successfully grown. Two technical reports of these students were written in 1988.

Shortly after his arrival, Dr. Bloodworth developed three trials to test:

1) Effect of cover crops and tillage on cotton.
2) Establishment methods of cover crops for no-till cotton.
3) Effect of cotton herbicides on cover crops.

Since cotton had not been grown there during the history of the PMC, it was grown in the conventional manner in 1988 as would be done when a conventional tillage system is converted to no-till. Cotton yield on the PMC fields was 1.1 bales/acre.

In the fall of 1988, another trial was initiated to test different burndown herbicides on species used for winter cover in no-till cotton fields to determine the most efficient and economical rate.

PROJECTS FOR RELEASE OF IMPROVED CULTIVARS

From start to finish, the release of an improved cultivar requires about 15 years of testing. The process is usually divided into a series of seven basic steps that are designed to determine the adaptiveness and performance of the plants and to ensure an adequate supply of materials.

Step 1: Assembly

After a project plan is developed and approved by the State Conservationists' Advisory Committee, the PMC starts to collect seeds or plants from many situations to compare at the PMC. Plant collections may come from a variety of sources, both foreign and native. At the PMC, each collection is given a unique accession number for identification throughout the testing program.

A large number of accessions is usually required to ensure that superior plants will be present. An assembly of more than 35 collections is called a major assembly. Many major assemblies have more than 100 collections. In 1988, a schedule to initiate assemblies was developed to distribute the workload evenly over a number of years. The schedule was approved by the State Conservationists' Advisory Committee subject to annual review, as are all PMC activities. The schedule for assembly is as follows:

1988	Winter rye (*Secale cereale*) for cover crop.
1988	Dwarf wheat (*Triticum aestivum*) for no-till.
1989	Annual bluegrass (*Poa annua*) for no-till cotton.
1989	Rescuegrass (*Bromus unioloides*) for winter cover.
1990	Sour clover (*Melilotus indica*) for winter cover.
1990	Mustard (Cruciferae) for winter cover.
1990	Eastern gamagrass (*Tripsacum dactyloides*) for forage.
1991	Henbit (*Lamium amplexicaule*) for no-till.
1991	Chickweed (Caryophyllaceae) for no-till.
1991	Wild geranium (*Geranium* sp.) for no-till.
1991	Wood-sorrel (*Oxalis* sp.) for no-till.
1992	Low panicums (*Dicanthelium* spp.) for critical areas.
1993	Vasey grass (*Paspalum urvillei*) for warm-season forage.

The assemblies of winter rye and wheat were to be obtained from the National Small Grain Collection (NSGC). Because NSGC was being moved in 1988, it could not supply the seeds for planting in the fall of 1988, and the project was delayed to 1989. Requests for field collections of annual bluegrass and rescuegrass are to be issued early in 1989.

Step 2: Initial Evaluation

After the seeds or plants arrive at the PMC and are given an accession number, they are planted in rows or small plots. Accessions in each assembly are planted in groups so an easier and more meaningful comparison can be made. Periodically PMC personnel evaluate the plants for vigor; seed production; resistance to diseases and insects; and tolerance to heat, drought, and cold. Also, the plants are measured and dates of flowering and maturity recorded. At the end of this step, a few of the best accessions are selected for advanced evaluation.

In 1988, initial evaluations continued for the following species:

- Purpletop (Tridens flavus) for critical area stabilization and rangeland improvement.
- Beaked panicgrass (Panicum anceps) for critical area stabilization and rangeland improvement.
- Sensitive plant (Mimosa strigillosa) for cropland erosion control and critical area stabilization.
- Bahiagrass (Paspalum notatum), cold-tolerant, for critical area stabilization.
- Crownvetch (Coronialla varia), heat-tolerant, for critical area stabilization.
- Lespedezas (Lespedeza sp.), upright natives, for erosion control in forests and field borders.
- Trailing wild bean (Strophostyles sp.) for erosion control in forests and field borders.

In addition to the purposes given for evaluating the preceding species, most species have secondary benefits for other conservation purposes.

Step 3: Initial or Small Scale Increase

When an initial evaluation has been completed and accessions with superior qualities have been selected, they are increased in small plots to provide material for additional testing. In 1988, initial increases were begun for the accessions of partridgepeas that were considered to have release potential. These were in addition to other accessions already in advanced evaluations.

Step 4: Advanced Testing and Field Evaluation Plantings

When sufficient material has been increased, the accessions selected as superior in initial evaluations are tested for ability to solve one or more conservation problems in the PMC Long Range Program. The selected accessions are compared with standards plants that are currently considered the best to solve the problem.

Advanced testing often includes off-center field evaluation plantings (FEP) to test plants where soil or other conditions strongly contrast with those at the center. These are conducted as a part of the PMC program or in conjunction with other plant materials activities.

In 1988, advanced evaluations continued for giant reed (Arundo donax). One accession, PI-432432, was considered to be the best of four at the Coffeeville PMC. It was being compared to superior selections at the Brooksville (FL) PMC in a cooperative project.

Step 5: Field or Large Scale Increase

Accessions that are candidates for release are grown in large quantities for the final stages of evaluation. Some of the material continues to be used in advanced evaluations or FEPs, but much is destined for field plantings. Increases of common and 'Appalow' sericea lespedeza were grown in 1988 for field plantings. Also a large quantity of 'Quail Haven' reseeding soybean, released in 1986, was produced to provide seed for commercial growers.

Step 6: Field Plantings

The last step in evaluating a candidate for release by a PMC is the field planting (not to be confused with the field evaluation planting or FEP). In field plantings, the test plant is compared to standards (best plants currently available for that purpose) in actual field situations. At this point, the test plants are still in the experimental stage and are not to be harvested and sold before they are formally released.

Candidates for release at the Coffeeville PMC being tested in field plantings in 1988 were:

Afghan reedgrass (Calamagrostis pseudophragmites, PI-220584)
Goat willow (Salix caprea, PI-434284)
Gilg willow (Salix gilgiana, 9004882)
Erect willow (Salix rigida, 9004885)
Prairie willow (Salix humilis, 9004886)

Step 7: Cultivar Release and Use

When data from all of the previous steps have been assembled, they are presented to the cooperating agencies and release committee. If they agreed that the plant is superior, the plant is cooperatively named and released for commercial production and use. The Coffeeville PMC has responsibility for maintaining breeder and foundation blocks of its releases, and does not supply the plant material to the general public. It only maintains small "foundation" blocks to provide genetically pure stock to qualified growers who supply the public.

PLANT MATERIALS AVAILABLE FOR COMMERCIAL INCREASE

Information about commercial production of SCS-released cultivars may be obtained through any office of the Soil Conservation Service. Releases from the Coffeeville PMC that are available are:

'QUAIL HAVEN' RESEEDING SOYBEAN

This plant was released for wildlife in 1986. It is a vining annual legume that produces an abundance of small seed that are eaten by quail, dove, and turkey. It has many hard seed that remain on the soil throughout the winter and germinate the following spring. The plants may also be used for hay and as summer cover for soil improvement.

'MEECHEE' ARROWLEAF CLOVER

This is an annual legume that is a high producer of quality forage in spring and early summer. It may also be used as a cool-season cover crop.

'CHIWAPA' JAPANESE MILLET

This plant was released for wetland wildlife by the Coffeeville PMC because of its ability to withstand flooding. It may be sowed on mud flats in the summer and flooded to provide food for waterfowl. It also produces an abundance of foliage that can be utilized by livestock.

'HALIFAX' MAIDENCANE

This grass does not produce seed so it is established from coarse rhizomes. It is an excellent plant for stabilization of stream and lake banks.

Seeds of all of the above except 'Halifax" maidencane are available for certified seed production from:

Foundation Seed Stock
Mississippi State University

Those interested in production of 'Halifax" maidencane or other SCS releases may also contact:

Plant Materials Specialist
Soil Conservation Service
Suite 1321, Federal Building
100 West Capitol Street
Jackson, MS 39269

FIELD ACTIVITIES IN ARKANSAS, LOUISIANA, AND MISSISSIPPI

EXPANSION IN LOUISIANA

In 1984, the Golden Meadow Plant Materials Laboratory was established to evaluate plant materials for erosion control in coastal areas in Louisiana. First assemblies were smooth cordgrass (Spartina alternifolia) and giant cutgrass (Zizaniopsis miliacea). The coastal area was in the service area of the Brooksville (FL) PMC, and the laboratory began as an FEP under direction of Robert Glennon, manager at Brooksville. In 1988 plans were made to change the laboratory to the Golden Meadow Plant Materials Center with Tommy Biles as manager. Michael J. Materne was designated to provide technical guidance for the Golden Meadow PMC and become Plant Materials Specialist for Louisiana.

FIELD EVALUATION PLANTINGS

Evaluations for field evaluation plantings which were begun in Arkansas, Louisiana, and Mississippi (The Delta States) in 1983 and 1984 were concluded in 1988, except some woody plantings for mine reclamation. One new field evaluation planting was established near the Coffeeville PMC in the fall of 1987 and concluded in 1988. It was previously discussed in the "Cover Crop for Cotton" section.

Arkansas Blackland Prairie

This planting made in 1984 in a pasture near Tollette, Arkansas, included a management trial and an adaptation trial. All parts of the study were completed and technical reports written by 1988 except for the results from the adaptation trial and a small management study. The final technical report from this FEP was written in 1988 and the project terminated.

Surface Mine Reclamation

Cooperative plantings with the Mississippi Department of Natural Resources (Bureau of Geology) were made in 1985 to select commercially available plants which could give adequate cover on harsh sites where the landowner cannot afford to use standard methods. In the spring, 24 warm-season varieties with 4 replications were planted at 6 locations in Mississippi on a wide range of materials. A similar planting was started in Louisiana in 1986. Plantings of woody and cool-season varieties were also made at the Crystal Springs and Hattiesburg sites.

Evaluations were concluded for these in 1988 for all of these except the woody plantings. Final reports for these have not been prepared.

COTTON FIELD TRIALS

As a part of the COTTON PROJECT directed by Dr. Bloodworth, Mississippi and Louisiana established field-size demonstrations of no-till cotton. Design of the trials was left to the discretion of each state, but they agreed to work together and share information.

Mississippi selected farms at five different locations. Yield was compared to conventional production on the same farm. Cotton production along with the erosion control effectiveness of the cover crops was as follows:

COVER CROP	YIELD (Bales/Acre) No-Till	YIELD (Bales/Acre) Conventional	EROSION CONTROL* EFFECTIVENESS (%)
Arrowleaf Clover	1.1	1.4	89
Crimson Clover	0.9	1.8	88
Hairy Vetch	1.5	1.5	91
Wheat	0.5	0.9	95
Native (Weeds)	1.9	2.2	88

The SCS in Louisiana developed a cooperative field-size demonstration with the Agricultural Experiment Station and Cooperative Extension Service. A cotton field near Winnsboro was selected and the field was divided into 12 plots of 6 treatments and 2 replications. Average yields obtained by the six treatment methods were as follows:

TREATMENT	COTTON YIELD (Bales/Acre)	COVER CROP (lb/acre dry)	EROSION CONTROL* EFFECTIVENESS (%)
No-till, vetch cover	2.2	1350	94
No-till, wheat cover	1.7	2727	95
No-till, native cover	2.1	660	90
Ridge till, native cover	1.9	377	78
Conventional, vetch cover	2.2	1218	68
Conventional, native cover	2.1	500	57

Yield was affected by drought early in 1988. Plantings were delayed and replanting was necessary in some sites. However, similar behavior was identified in plantings in both states. Although wheat was the best cover crop for erosion control, yield was least when cotton was planted no-till into it. The best species for planting no-till appeared to be hairy vetch. Yield with vetch was essentially the same as by the conventional method although some cutworm damage was noted. Yield was also high when cotton was no-tilled into native cover (weeds) although the cover was not as effective for erosion control. However, these data are averages only for the first year in a three-year study.

* Effectiveness is the comparison between clean-till fallow (C-value of 1) and the treatment.

FIELD PLANTINGS

Field plantings are made to gather information on candidates for release from PMCs. After release, they may be made to gather more information when their range of adaptation is not clearly known.

Prior to field plantings, a long range plan is prepared for the orderly testing of the promising plant. The plantings are usually scheduled over a number of years in a variety of soil and climatic conditions, if possible. Field plantings are coordinated by Plant Material Specialists who generally serve more than one state, and each state may test plants from several PMCs. The test sites are provided by conservation district cooperators, mining companies, local governments, and others. The plantings and evaluations are usually conducted through SCS field offices.

No new long range plans for field plantings were implemented in 1988. Evaluations continued for those previously listed in the 1987 Annual Report. When evaluations are completed, the data will be summarized and technical papers will be made available to participating field offices and other interested individuals.

TECHNICAL PAPERS WRITTEN IN 1988

COFFEEVILLE PLANT MATERIALS CENTER, TECHNICAL NOTES

No. 1. Arkansas Blackland Prairie Field Evaluation Planting. IX. Plant Performance in Adaptation Studies (1983-1987).

No. 2. Investigations into the Establishment of Vegetative Flumes at the Coffeeville Plant Materials Center (1983-1987).

No. 3. Evaluation of Potential Cover Crop Species for Use in Chemically Treated Cotton Fields.

No. 4. No-Till Trials for Common Row Crops. I: Milo Production Following Six Cover Crop Treatments (1985-1986).

No. 5. No-Till Trials for Common Row Crops. II: Establishment of Cotton and Soybeans into Winter Cover Without Plowing (1986-1987).

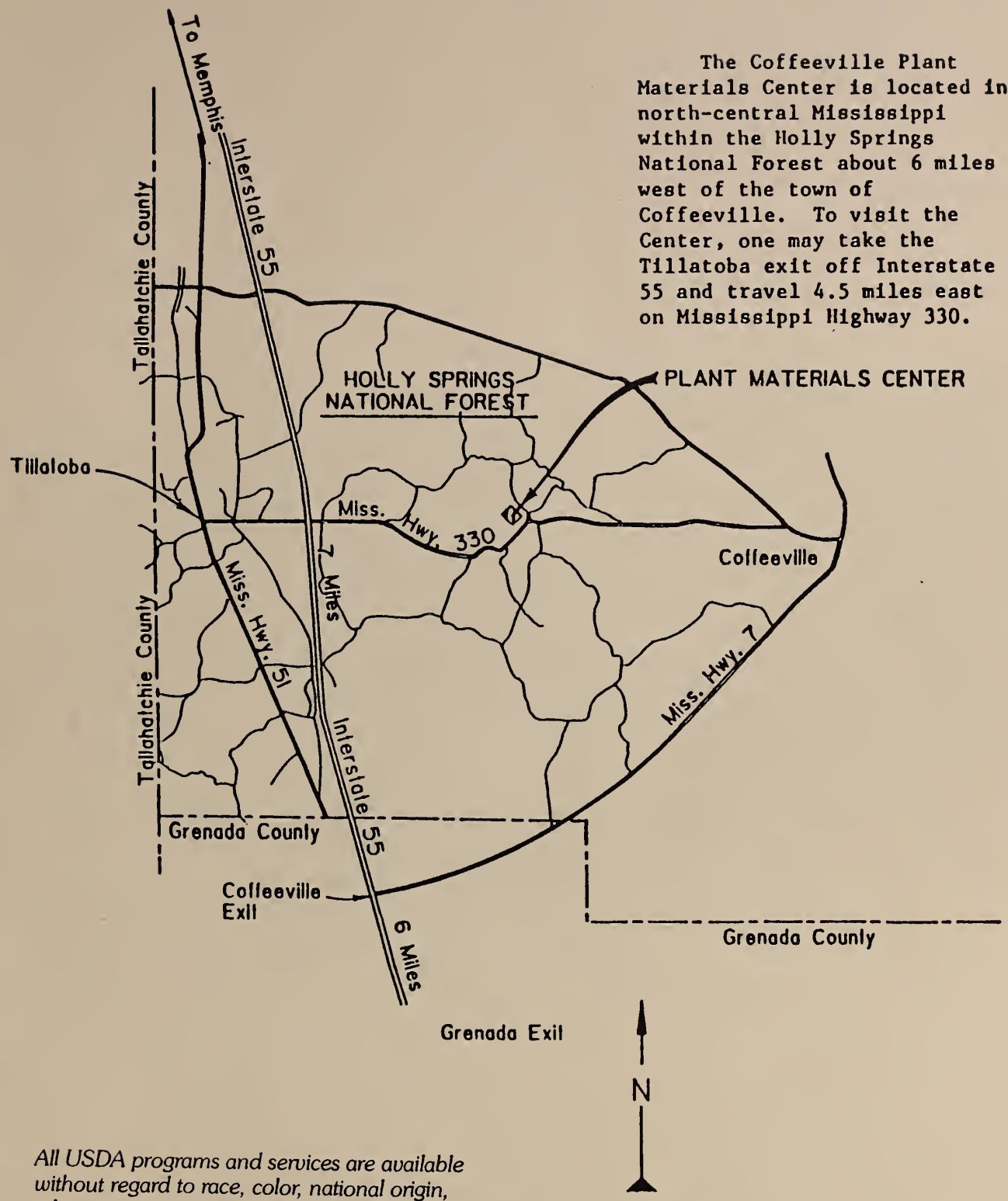
PLANT MATERIALS REPORT FOR ARKANSAS, LOUISIANA, AND MISSISSIPPI

No. 1. An Evaluation of Evaluations.

Copies of these reports may be obtained from the Coffeeville Plant Materials Center or from:

Plant Materials Specialist
Soil Conservation Service
Suite 1321, Federal Building
100 West Capitol Street
Jackson, MS 39269

The Coffeeville Plant Materials Center is located in north-central Mississippi within the Holly Springs National Forest about 6 miles west of the town of Coffeeville. To visit the Center, one may take the Tillatoba exit off Interstate 55 and travel 4.5 miles east on Mississippi Highway 330.



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